Acta Mineralogica–Petrographica, Szeged, XLI, Supplementum, 2000

OPTICAL PROPERTIES OF FIBROUS ZEOLITES OF THE BAKONY–BALATON HIGHLANDS, HUNGARY

VÁCZI, T. (Department of Mineralogy, Eötvös L. University, Budapest, Hungary)
E-mail: thomas@ludens.elte.hu

We studied fibrous zeolites occurring in cavities of young (7–3 Ma) alkaline basalts of the western part of the Bakony–Balaton Highlands Volcanic Field (BBHVF), Hungary. This small scale mineralisation is characterised by zeolites and calcium carbonates.

Fibrous zeolites can be divided into two groups on the basis of Si/Al ordering. One can distinguish fully ordered species (natrolite, mesolite, scolecite) and ones with different degrees of disorder (e.g. gonnardite, thomsonite). The fully ordered fibrous zeolites have very constrained composition fields, while the disordered ones constitute crystalline solution series (ROSS *et al.*, 1992).

The problem in the investigation of this mineral group lies in the fact that all fibrous zeolites share a common silicate framework, for which reason they are rather difficult to identify with standard XRD methods. However, their optical properties and optical orientation related to morphology are highly subject to changes in chemical composition (GUNTER & RIBBE, 1993). This offers a fairly straightforward way to their identification by spindle stage.

The fourteen samples investigated were originated from five localities of the BBHVF. The crystals are colourless, mostly clear, acicular, (pseudo)tetragonal in habit, with pyramidal ending forms. Sizes of crystals are up to ca. 1.5 × 0.2 mm. Macroscopically there is no discernible difference between crystals from any of the localities.

Before measurement the crystals were fully hydrated by keeping them in a vapour rich atmosphere for at least 24 hours.

Three kinds of fibrous zeolites were documented. The results can be summarised as follows. (The data given are mean values.)

1. Orthorhombic, $\gamma = c$, $2V = 56°$, $\alpha = 1.481$, $\beta = 1.484$, $\gamma = 1.493$. These data allow to identify the mineral as **natrolite**.

2. Very close to isotropic, $n = 1.502–506$. These are characteristic for **mesolite**.

3. Monoclinic, $\beta \wedge c \approx 30°$, $2V = 54°$, $\alpha = 1.482$, $\beta = 1.485$, $\gamma = 1.494$. There is no fibrous zeolite cited with similar optical properties, we use "**Type 3**" as working notation for that phase. Paranatrolite (unstable variety, not approved by IMA) is given as monoclinic but with 2V lower than 10°. Furthermore, it is established that paranatrolite, if kept dry, dehydrates to tetranatrolite (TSCHERNICH, 1992). It is not stated whether it is a reversible process or not. However, all examined samples were kept without any special treatment, except for the full hydration prior to measurement.

At least 9 different crystals from two localities showed "Type 3" optical features, therefore we believe that "Type 3" is a stable, until now not described fibrous zeolite phase. The full mineralogical characterisation of this phase is in progress.

References

ROSS, M., FLOHR, M.J.K. & ROSS, D.R. (1992). Amer. Mineralogist, 77: 685–703.
TSCHERNICH, R.W. (1992). Zeolites of the World. Geoscience Press, Phoenix, AZ.
GUNTER, M.E. & RIBBE, P.H. (1993). Zeolites, 13: 435–440.